The Coming Revolution In Shortwave Broadcasting

Planning and common-sense scheduling unchoke the shortwave broadcast bands.

STANLEY LEINWOLL

IF YOU'VE NOTICED THAT SHORTwave radio reception is better than it has been for recent years, it is probably due to the work of a group of broadcasting experts who meet semi-annually to reduce interference by coordinating their shortwave broadcasting schedules. This work is all the more noteworthy because it comes at a time of minimum sunspot activity, when reception conditions are ordinarily at their worst.

Known as the High Frequency Coordinating Committee (HFCC), the group consists of some 70 delegates from 27 countries, representing approximately 50 shortwave broadcasting organizations. The HFCC coordinates more than 17,000 frequency hours, which amounts to more than 70 percent of the world's total shortwave broadcasting effort. Table I lists the countries attending the HFCC Conference held in Bern, Switzerland, from February 5th through the 9th, 1996.

The HFCC first met in April, 1991. There were 14 countries in attendance. The cold war had ended, radio jamming had ended, and telecommunication authorities from East and West were discussing methods of eliminating, or at least alleviating, unintentional harmful interference which permeated the shortwave bands.

Committee membership has grown with time. Admission to the HFCC is open to all broadcasters; any administration wishing to attend is first invited to attend a semiannual conference as an observer. Membership is extended to them at the conclusion of that meeting.

HFCC meetings last a full week, and they have been increasingly successful in their efforts to resolve co-channel and adjacent-channel frequency conflicts, termed "collisions."

The HFCC coordinates a winter schedule [W], and a summer schedule [Z], the periods of each are now determined by European clock time-shifts. For example, the current Z schedule commenced March 31, 1996, when European Daylight Time started, and will end on October 27, 1996, when European Standard Time is resumed. Most broadcasters now conform to these two-per-year schedule formats. Meetings are convened about six weeks before the commencement of a new schedule, and the participants have been taking turns hosting conferences.

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TABLE 1—COUNTRIES ATTENDING FIRST 1996 HFCC CONFERENCE

Austria	Monaco
Belgium	Netherlands
Bulgaria	Norway
Canada	Poland
Czech Republic	Romania
Denmark	Russia
Finland	Slovakia
France	Sweden
Germany	Switzerland
Greece	Turkey
Hungary	Ukraine
Iran	United Kingdom
Israel	USA
Italy	Vatican City

Note: The United States was represented by delegates from the International Bureau of Broadcasting (IBB) on behalf of Radio Free Europe, Radio Liberty and The Voice of America. The Federal Communications Commission (FCC) was present on behalf of 23 privately owned shortwave broadcast stations licensed by the FCC. Monaco was represented by TransWorld Radio.

Participating broadcasters submitted their requirements on diskette, and the data is inserted into a data bank; a computer compiles it in useful form and a book is published by a host country. A typical schedule is more than 200 pages long. At the beginning of a conference, schedules are distributed to each participant. A representative Z-96 (Summer, 1996) schedule page at the begining of the conference is shown at the top of Fig. 1. The technical characteristics of each requirement include the frequency, hours of operation, transmitter power, type of antenna being used, beam heading of the antenna, location of the transmitter site, and the target area. Target areas are depicted and described in Fig. 2.

The software, which has been developed by J.W. Drexhage of Radio Nederland, and H. Scholz and T. Feustel of Deutsche Welle [Radio Germany] is being constantly refined to handle data inputs and readable outputs. The software can now analyze conflicts among two or more entries, defining these as co-channel (two stations beamed to the same target areas on the same frequency), or adjacent channel (±5 kHz conflicts beamed to the same target area). In Fig. 1, a co-channel collision between Ukraine (RRT) and Israel (ISL) on 11,590 kHz is indicated by the dark shading. Adjacent-channel collisions are shown by light shading.

Resolving conflicts

The software is now at the stage where each organization participating in an HFCC conference receives a list of collisions between their requirements and those of other broadcasters, and a list of all the requirements as they appear in the HFCC book on the first day of the conference. Each broadcaster can then check to be certain that requirements have been correctly posted; incompatibilities with other broadcasters are then examined and possible solutions can be suggested. At that point, the informal coordination process of the HFCC begins.

Collisions are dealt with during bilateral consultations; these are conducted in English, with Russian to English, and English to Russian translation, where appropriate. The languages used are only limited by the number of participants. The discussions are generally amicable, because those taking part in the HFCC meeting are interested in resolving as many problems as possible. The bottom of Fig. 1 is a page from the most recent version of the Z-96 schedule; it shows that the collision at the top of Fig. 1 was solved by Israel, which moved its requirement from 11,590 kHz to another frequency.

There are several unwritten rules which guide the conference members in their efforts to resolve collisions. Among these are:

- If a broadcaster has been operating on a frequency-time slot in previous schedules, and a conflict is created by another broadcaster who is new on the same frequency, the newcomer is generally expected to move to another frequency, or delete the requirement.
- If a broadcaster has a transmission on a frequency for a long period, and another broadcaster is on the same frequency for a shorter period and they have a collision, it is generally easier for the shorter transmission period to find another frequency. Usually the broadcaster with the shorter collision period vacates the frequency.
- A problem can sometimes be resolved if one of the broadcasters in conflict can move its transmission to another useful band where the propagation features are not compromised.

About the Author

Stanley Leinwoll has worked as a hands-on shortwave broadcaster for almost half a century. He started working for the Voice of America as a Propagation Specialist in 1950. In 1957 he joined Radio Free Europe as its Radio Frequency and Propagation Manager. He was the Director of Engineering for Radio Free Europe/Radio Liberty from 1975 until his retirement in 1994. He is currently working as a Technical Consultant to three private sector US shortwave broadcasters, WYFR, WEWN, and WVHA, and he attended the February 1996 HFCC in Bern on behalf of his clients.

Mr. Leinwoll has served on five United States Delegations to International World Administrative Radio Conferences, and has also written extensively; of his ten books, titles include, *From Spark to Satellite, A History of Wireless Communication*, *Shortwave Propagation*, and *Space Communications*.

STANLEY LEINWOLL at work at the HFCC in Bern.

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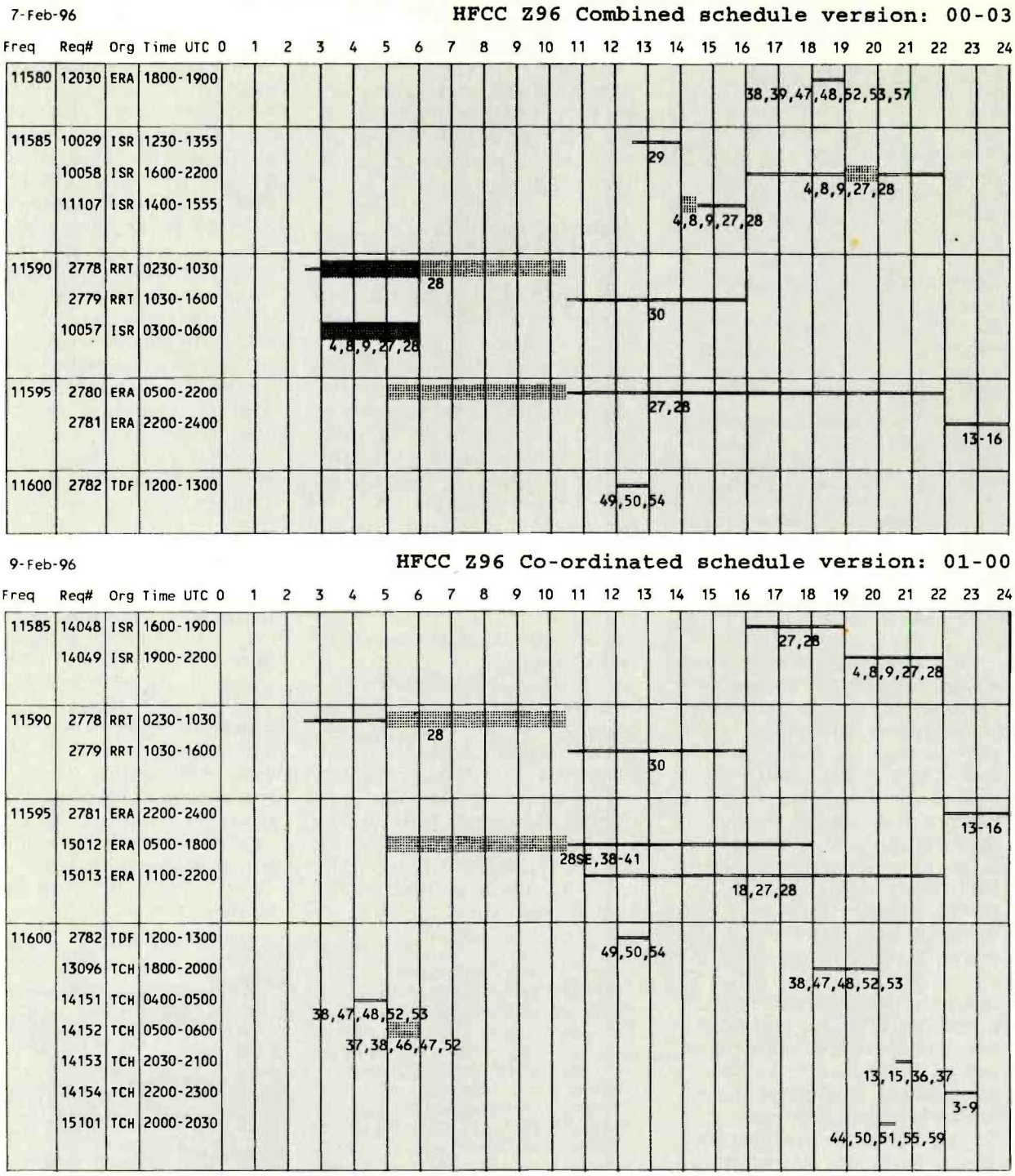

FIG. 1—TWO VIEWS OF A PAGE from the Summer 1996 HFCC working schedule. The top view printed at the beginning of the conference shows a co-channel collision (darkly shaded area) on 15,590 kHz between Ukraine (RRT) and Israel (ISL). Adjacent channel collisions (± 5 kHz) are shown lightly shaded. The bottom view is the result of the conference's final version, indicating that the colision between Ukraine and Israel was solved by Israel vacating the frequency. An adjacent channel problem betwen Ukraine on 15,590 kHz and Greece (ERA), on 11,595 kHz, could not be resolved. Note the the 11,600 kHz frequency has many new schedules added, obviously taken from many other frequencies to avoid collisions.

It is common to switch from the 9-MHz band to either 7-MHz or 11-Mhz band.

The general practice has been that the larger broadcasters have been helpful in trying to assist the smaller ones. Some of the smaller participating broadcasters have as few as one or two transmitters, while some of the larger ones may have more than 100 transmitters at many sites hundreds of miles apart. It is a typical result for a broadcasting giant to switch from his original requirement to another on a different frequency, at another transmitting site and still enjoy favorable propagation results for his transmission. Small broadcasters with one or two

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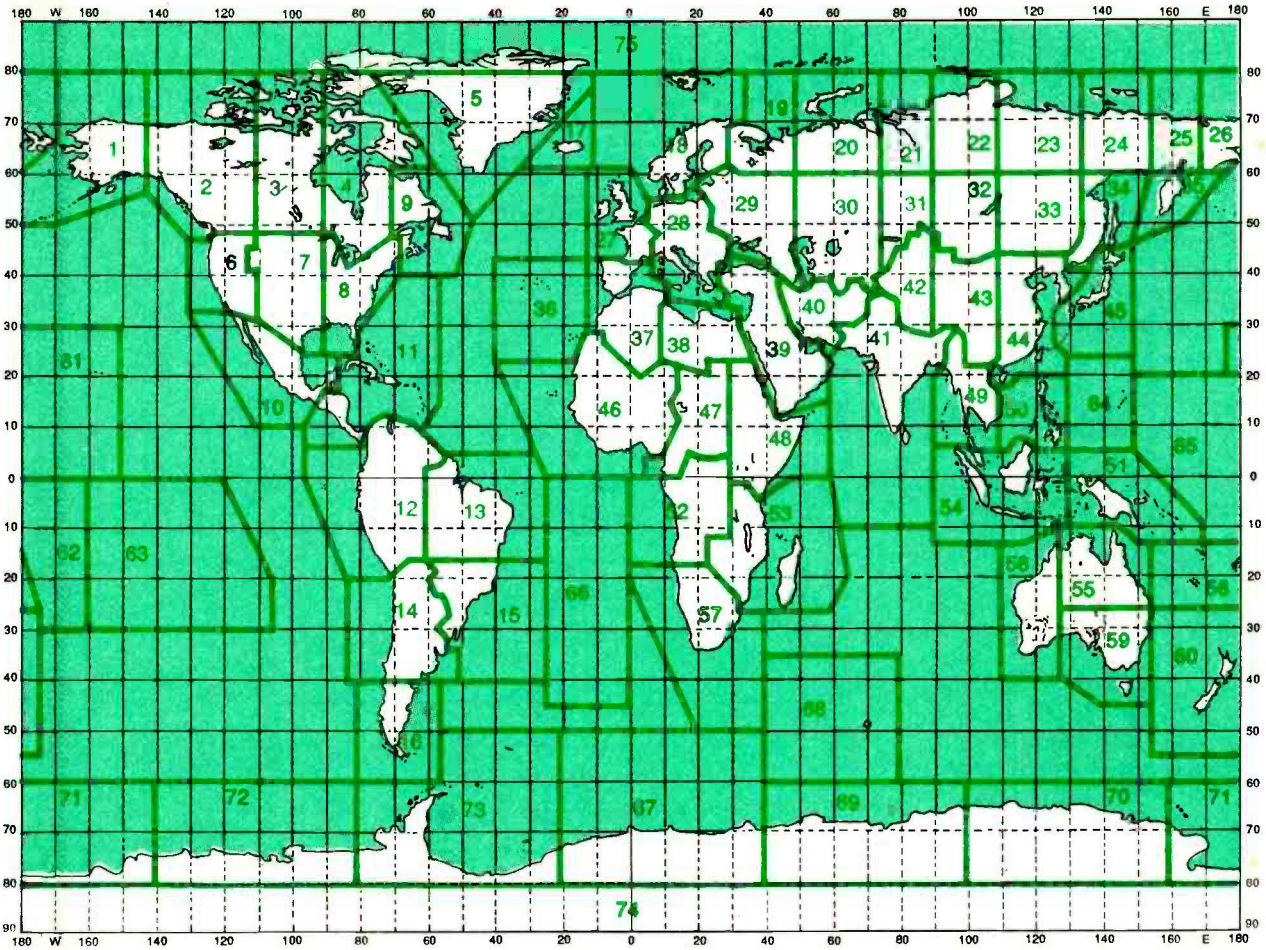

FIG. 2—THE TARGET AREA MAP of the world used to define collisions. The numbered areas are target areas often referred to as "CIRAF" zones, a Spanish acronym referring to the International High Frequency Radio Conference held in Mexico City in 1947 where they were first defined. Collisions are said to occur when two or more broadcasters target the same CIRAF zone on the same frequency, or on adjacent frequencies.

sites usually do not enjoy this flexibility of choice.

Russian conflicts

The Russians are the world's largest shortwave broadcaster, and their broadcasting requirements are generally about five thousand frequency hours per schedule, or about 30 percent of all submitted requirements. Consequently, the Russians have the greatest number of collisions with other participants. The HFCC has found the most efficient way of dealing with collisions involving the Russians has been to divide the collisions and to set them up at two separate tables at the conference. The six member Russian delegation generally divides into two groups, one of which handles the lower frequencies (6-11 MHz), and a second group with handles collisions involving 13 MHz and higher.

Broadcasters who have problems involving the Russians make an appointment to speak to them. The Russian delegates have been extremely cooperative in the HFCC, and have contributed toward the solution of numerous conflicts.

The evolution of HFCC

Since the formation of the HFCC its membership has doubled; as a natural consequence of this growth the number of collisions and the number of solutions has increased significantly. At a recent conference, there were 507 co-channel collisions at the start of the conference. By noon of the fifth and final day the number had been reduced to 299, an impressive 41 percent reduction in the most serious conflicts. This may not sound like much improvement; however, consider this: Each collision involves at least two broadcasters. When 208 collisions are rectified, that means at least 416 additional uninterfered daily and weekly broadcasts are transmitted for the world to hear.

Rapid resolution of conflicts has been brought about, in part, by the application of dedicated software, which has enabled the HFCC to provide the conferees with daily, completely up-to-date, usage books, requirements lists, and lists of collisions. In order to produce timely lists, changes made on a given day are collected at 4 P.M. and inserted into the data base. The computer processes the requirement changes and prints new lists that are available at the start of the next day's proceedings.

Figure 3 indicates the shortwave bands that have been gen-

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erally available to the participants. Since 1979 the bands allocated to high-frequency broadcasting have been expanded twice. The latest expansion occurred in 1992, but the new frequencies allocated at that time have not become universally available.

Unresolved problems

Like all human endeavors, there are problems within the HFCC which currently limit its effectiveness. Several of these are worthy of mention.

The frequency managers participating in HFCC activities have differing levels of technical sophistication, and different levels of experience. Nevertheless, the members treat each other as co-equals. Those who are more experienced have been working with their counterparts in other organizations to assist with the dissemination of shortwave radio propagation data, and with information dealing with actual occupancy of the shortwave bands.

The handling of in-season changes has not yet been fully mastered. The distribution of information involving some 50 broadcast organizations is sometimes cumbersome. Methods of distributing schedule changes are constantly improving. They are not yet perfect.

The HFCC has evolved into a highly productive group dedicated to the solutions of problems in the high-frequency bands being used for broadcasting. Progress in the last five years has been significant and should continue as the software continues to be improved, and as participating broadcasters become more aware of the realities in specifying their requirements and the responsibilities of coordination.

The future—more planning

Over the past fifty years there have been numerous unsuccessful attempts to plan the bands used for shortwave broadcasting. Such planning attempts have failed because the number of requirements submitted by the broadcasters has always far exceeded the amount of available radio spectrum. To fit all the requirements into a master plan would necessitate either mandatory reduction of some of these requirements, or the massive expansion of the bands allocated to high-frequency broadcasting.

The most recent efforts to plan the high-frequency bands at high-frequency broadcasting planning conferences in 1984 and 1987 left much to be desired. The HFCC conferences, which are, in essence, short-term planning exercises, have provided the most viable means of establishing a world-wide planning model. The informal approach taken by the HFCC participants has provided a relaxed forum for solving many problems, and suggests a world-wide planning procedure.

By establishing regional committees like the HFCC for Asia and the Far East, Africa and the Middle East, Europe and the Americas, a procedure exists for coordinating up to 100 percent of the world's shortwave broadcasting allocations. Such informal regional conferences could provide the world with the framework for a revolutionary planning procedure, offering a degree of success never before achieved in the arena of world high-frequency broadcast planning. Such a revolution appears to be a distinct possibility for the future. Ω

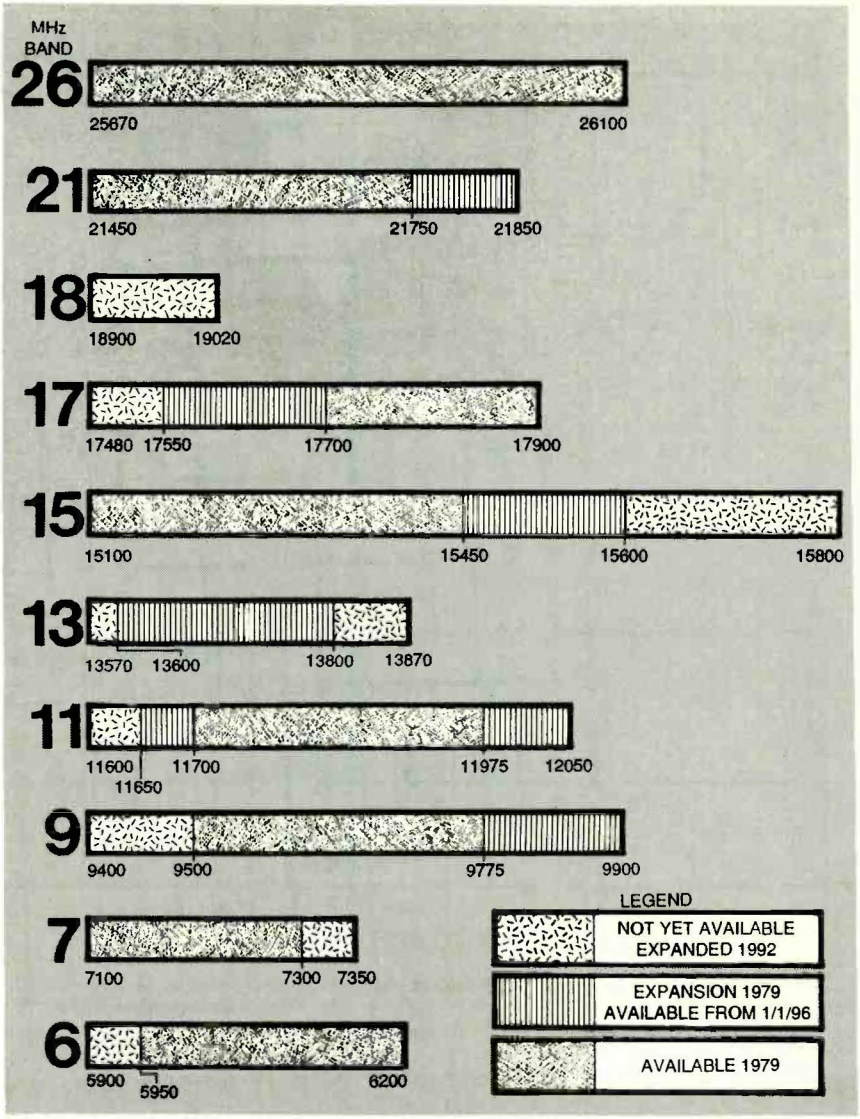

FIG. 3—THESE ARE THE SHORTWAVE bands that are available to participants. They have been expanded twice since 1979.

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